60th Anniversary
Serving Justice Through Science

A Compilation of Papers and Presentations
Presented at the 2000 through 2002 ASQDE Meetings
ABSTRACTS OF PRESENTATIONS

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• Handwriting Comparison - Three Different Languages (Part 1)
  Avi Abulafia and Yana Gerber

Abstract: The world has become a small village; people move from one place to another, speak and write different languages - and the questioned document examiner faces a situation in which he has to compare two or more different languages and alphabets. This paper will show promising preliminary results of a research conducted in our laboratory. Handwriting samples were collected from 170 people. Each one wrote in Hebrew, Arabic and English. The Hebrew handwriting is compared with the Arabic and English handwriting to see if it is possible to reach a conclusion as to there being common authorship, based on the inter-language comparison.

• Current Methods for Dating Ink on Documents
  Valery Aginsky

Abstract: This paper evaluates the capabilities of ink dating methods currently applied to cases. Related analytical techniques and recent research in determining the age of ink on documents are also reviewed. Besides, a principal difference between temperature aging ("normal" aging) and photodegradation (fading) of ink is considered.

• A Commentary on the Printing Process Identification and Image Analysis for FDEs workshop (RIT 6/02)
  Bonnie L. Beal

Abstract: An overview of the Printing Process Identification and Image Analysis for Forensic Document Examiners (FDE) workshop hosted by the Rochester Institute of Technology (RIT) will be presented. The course and instructors will be critiqued in regard to the information provided and the hands-on applications. The stated objectives from the literature for this workshop are: instruct document examiners in characteristics of traditional and non-impact printing systems; the interrelationship of the imaging process, ink and substrate, and how to evaluate all three; technical knowledge to help the examiner differentiate between an authentic document and a fraudulent replica; and how the latest image capture and analysis systems can help in the authentication of the document. The pros and cons of each section will be presented.
• **The Application of 3D-Profilometry in the Analysis of the "Crossing Lines" Problem Within Document Examination**
  Veerle Berx

Abstract: At the NICC the laser profilometry technique is explored to retrieve new criminalistic applications of 3D-measurements on different kinds of traces. One of the main advantages of this technique is the fact that the surfaces of the pieces of evidence remain unaltered after scanning unlike several other detection systems. This can be of great interest for questioned document examiners. The topic the researchers at the NICC/INCC are dealing with for now, is the ‘crossing lines’ problem. Optical examination, lifting techniques and electron microscopy are widely used methods for the determination of the writing order of crossing texts. Measuring the topography of the surface with the laser profilometer can provide additional information or determine the writing order where the common methods fail. Apparently four major factors are influencing the capacity of the profilometer to deal with the crossing texts: writing pressure and underlying support, writing material, type of paper and writing angle. Several samples of crossing strokes, both heterogeneous and homogeneous, were scanned. With the laser profilometry technique we managed, in the first phase of this research, to determine in a great number of cases the order in which the written lines were applied. This makes laser profilometry a promising technique in fraud detection.

• **Parkinson's Disease and Handwriting**
  Julio H. Bradley

Abstract: This is a real case of two questioned signatures showing evident and conspicuous anomalies attributed to Parkinson's Disease, that as many times happens, did not exist. However, a similar signature was offered as genuine to be compared as a known signature. This paper presents the arguments employed to demonstrate that the questioned signatures and the known were forgeries.

• **Ink Jet Printers**
  Patrick Chase, Hewlett-Packard

Abstract: Discussion of inkjet printers.
“Express Service” of the Questioned Documents Section, Government Laboratory, Hong Kong Special Administrative Region
Patrick Ya Sang Cheng and Daniel In Jea Wong

Abstract: “Express Service” of the Questioned Documents Section, Government Laboratory, Hong Kong Special Administrative Region (HKSAR) was commenced in 1996 with the aim of providing speedy, reliable, and scientific examinations of official documents. In the HKSAR, the statutory period under which a person may be detained prior to being formally charged for an offense is 48 hours. The Government Laboratory pledges to complete forensic examination of these document items within one working day with the results presented in a written statement format. The laboratory has coped with the augmented workload through target specific examination processes and increase in the overall efficiency employing a computer assisted instrument (Video Spectra Comparator-VSC). Currently an average of 55 items are examined weekly. Of the multitude of official documents being examined during the past 12 months, the People’s Republic of China Passport and the Two-way Permit constituted nearly 40% of all the items examined, with photo-substitution and page-substitution being the common methods of alteration attempted. Other examples of forgery methods in official documents are also discussed.

Applications of Energy Dispersive X-Ray Microanalysis to Toner Materials from Photocopiers
Goldie Chopra and Dr. V. N. Sehgal

Abstract: The main aim is to determine the inorganic contents present in the photocopy toners, to distinguish between monocomponent and dual component process photocopy toner types using SEM/EDXA. A study has been made of the photocopy toners used in photocopying processes to determine the inorganic contents present using Energy Dispersive Spectrometry. Discrimination of toner samples made on the basis of significant qualitative differences in the x-ray spectra produced has shown the categorization of samples as:
A. Those with elements present in major amounts, in order of increasing energy.
B. Those with elements present in minor amounts.
C. Those with elements present in trace amounts.

Differences in relative amounts of elements detected between raw and processed toner and significant variation in the loading of the base papers has been noted. Moreover, a clear distinction between mono component and dual component process toners has been made. A reference collection of spectra of raw toners has been compiled.

Conclusion: EDXA has proved to offer a high degree of discrimination which together with FTIR can be recommended as a means of providing reliable identification of inorganic elements and polymers used in toners. Though the instrumentation is quite expensive, SEM combined with EDXA is an excellent analytical tool/technique which is least destructive, fast and produces good quality spectra.
Abstract: The European Network of Forensic Science Institutes was founded in 1995 through a Memorandum of Understanding, signed by the Directors of thirty forensic science laboratories from twenty European countries. Since then membership of ENFSI has increased to some 48 laboratories from 33 different countries. The stated aim of ENFSI is to: “... promote co-operation between [forensic science organisations]... through... discussions of managerial questions, effectively utilise forensic science, scientific development, standards of practice, exchange of quality assurance methods and procedures, training, scientific exchange programs (including Research and Development projects) and co-operation with other international organisations.” To achieve this Aim, ENFSI has instated a number of Working Groups, specialising in different areas of forensic science. Whilst there is a Framework under which these Working Groups exist, each Working Group is given some autonomy to direct its activities in particular directions. The activities of these Working Groups are detailed in their own set of Aims and Objectives. These include: exchanging information and expertise; promoting Quality Assurance (e.g. by Proficiency Testing) and the development of professional standards; harmonising methods; combining research activities; and providing education and training within the particular area.

Since 1986 European Documents Experts working in “public” organisations have met every two years to discuss research, case studies and developments within their field. Through to 1998 six European Conferences for Police and Government Documents Experts (ECPGDE) had been held in Wiesbaden (1986), Zurich (1988), Rome (1990), Linköping (1992), Lisbon (1994) and London (1996), with planning and preparation being left to the host organisation, and little continuity between meetings.

In 1998, at the seventh ECPDGE (held in Scotland), it was decided that the ECPDGE should take a much more constructive, disciplined and pragmatic approach to the development and enhancement of their science. As such a formal Steering Committee was elected (consisting of representatives from forensic science organisations in England, France, Germany, Netherlands, Portugal, Scotland, Sweden and Switzerland). Between July 1998 and December 1999 the Steering Committee, with considerable assistance from forensic science organisations throughout Europe, have developed a set of Aims and Objectives. These include a number of projects aimed at potential Research and Development topics, Harmonisation of Methods and Procedures, introduction of Proficiency Testing and Collaborative Exercises, and enhancement of communication and co-operation, between forensic science organisations, in line with the Framework drawn up by ENFSI. In July 1999 ENFSI recognised this work by according the ECPDGE status as an ENFSI Working Group under the title European Document Experts Working Group (EDEWG).

The paper presented will report on the different activities of EDEWG since then and the importance thereof for the European Forensic Document Community.
• Gelatine Lifting: A Novel Technique for the Examination of Indented Writing
  Jan de Koeijer

Abstract: In the past many techniques have been presented for the examination of indented writing on documents. Of these techniques electrostatic detection is by far the method of choice for forensic document examiners due to its superior sensitivity and relative ease of use. However, electrostatic detection is limited to specific types of substrates such as writing pad paper, copy paper and most other types of regularly used office paper. Paper types falling outside this range such as glossy paper, paper of high basis weight or paper printed by lithography or gravure printing often give rise to problems with electrostatic detection resulting in a dramatic decrease of sensitivity or a lack of detection altogether. In this paper a novel technique for the examination of indented writing is presented which is in a sense complimentary to the technique of electrostatic detection as it is especially suitable for glossy coated and printed paper types and can in some instances also deal with paper types of higher basis weight. The method presented uses black gelatine lifter slabs that are normally used to lift fingerprints from smooth surfaces but are in this case applied to documents to lift a dust image off the surface of the paper. Due to the fact that the gelatine slab is slightly tacky, dust residing on the surface of the document will adhere to it and therefore be lifted off the paper surface. Indented writing grooves will normally contain more paper dust (due to damage of the surface layer) than the surrounding non-indented areas resulting in a white dust image of the indented writing against a black background. This image can quite easily be photographed using near-to-coaxial lighting. The gelatine lifting method outperforms oblique lighting for the detection of indented writing and is almost as sensitive as electrostatic detection if compared on the types of paper where both perform well. The main advantage of this new technique is however that it is especially suitable for those types of paper where electrostatic detection fails and is therefore a welcome addition to the range of methods available to a forensic document examiner for the examination of indented writing. In this paper results will be presented of the comparison of the gelatine lifting method, the electrostatic detection method and the oblique lighting method for the detection of indented writing on various paper types.

• Forgery versus Self-Modification
  Julia de la Pena

Abstract: In various countries outside the United States, but more especially in the Argentine Republic, it is very common to find short, illegible signatures drawn freely and with unsteady strokes which are easy to imitate and pose serious problems to document examiners who must ascertain if they are genuine or forged. Hints on the procedure to be adopted by the expert to handle this matter efficiently.

• The Update and Development of the ABFDE Syllabus
  Paige Doherty

Abstract: In 1979, the American Board of Forensic Document Examiners (ABFDE) published the first edition of a Syllabus to assist document examiners preparing for the written
portion of the certification test. This bibliography was not intended to be exhaustive, but rather
to distill the wealth of printed information available into a practical study tool. Recently, this
resource was updated and converted to a computerized database. The new database is useful for
searching for references, reviewing literature, and correlating articles to the ABFDE Objectives
for Training.

The new article database is built on a Microsoft Access platform, which was selected for its
versatility and compatibility with other database programs, such as AskSam and word-processing
software, such as Microsoft Word. A user can search the database in Access or AskSam
according to the subject, author, title, journal, or training objective. If the user does not have
access to a database program, then he or she is still able to scroll through the list or do a limited
search using word-processing software.

Nearly 20 Document Examiners donated their time and expertise to review document related
literature published over the past 20 years and to cull the reference list to a manageable size. In
conjunction with reviewing articles, the Syllabus was cross-referenced with the ABFDE
Objectives for Training. This has served to streamline the information in both publications by
associating literature in the Syllabus with specific training objectives.

The ultimate goal of this project was to design a tool for future testing candidates to use as they
study for the certification exams with both the Syllabus and Objectives for Training in hand.
However, the Syllabus may also be a useful technical resource for training programs and legal
inquiries.

• A Critical Review - Dr. Bryan Found on Handwriting Identification
  Charles L. Eggleston

Abstract: This paper critically reviews the work of Dr. Bryan J. Found on handwriting
identification. Twelve published papers, including doctoral dissertation, are evaluated.
Dr. Found is a principal researcher on the faculty of the School of Human Biosciences, La Trobe
University, Australia. He is a member of the document examination team at the Victoria
Forensic Science Center, Victoria Police, Australia. He is a member and Registered Forensic
Practitioner (in document examination) of the Australian and New Zealand Forensic Science
Society. Dr. Found has conducted extensive original research and reported on several aspects of
forensic handwriting identification, including: considerations of the theoretical basis; structure
and methodology of comparison and identification; development of objective measurement
techniques; and validity of examiner practices and expertise.

In 2001, the National Institute of Forensic Sciences Australia highly commended two of his
papers in the award category of Best Paper in a Refereed Journal. His work was foundational to
the development of a standardized method for forensic handwriting examination now being used
in police, government, and university laboratories in Australia and New Zealand.

Dr. Found's work is good science, well articulated, thought provoking, and of practical value.
• **Writing Instrument Inks**  
  Dr. Benedict D. Fabian, Formulabs

Abstract: The formulation of inks are application dependent. Ink on a document might come from a writing instrument, an impact printer, stamp pad or an inkjet printer. Rather than a description of dried ink on a document, this presentation will present the ink chemistry from the viewpoint of the developer and manufacturer. Included will be the rationale for selecting the specific dyes, resins, additives and solvent systems depending on the writing instrument employed as well as the requirements of the pen manufacturer. Dating tags will also be discussed. In the last 5 years there have been major changes in the writing ink industry, including raw material sourcing, performance requirements and consolidation of formerly independent writing instrument manufacturers.

• **A Critical Look at Laser Printer Line**  
  William J. Flynn and Kathleen Annunziata Nicolaides

Abstract: The authors prepared full-page laser printed documents, leaving space at various locations to add text by reinserting the documents back into the printers. Multiple reinsertion runs were made using a variety of full-color laser printers and monochrome laser printers.

A measuring device known as a MIDEO was calibrated the measure the vertical line spacings of the test documents to an accuracy of a single decipoint (1/720th in.). A statistical analysis of this preliminary data has shown that virtually all of the variation found in the line spacings of the non-reinserted texts describe a normal distribution. In only 1 of 30 trials, however, did the line spacing of the reinserted text fall within the normal variation of line spacings of the non-reinserted texts.

Although this was a fairly narrow experiment, it indicates that vertical line spacing measurements will likely provide an important tool for determining reinserted text.

• **Characterising the Nature of Individual and Collective Practitioner Skills in Forensic Handwriting Text and Signature Examinations**  
  Dr. Bryan Found and Doug Rogers

Abstract: The Forensic Expertise Profiling Laboratory (FEPL) provides research programs aimed specifically at characterising skill and expertise associated with forensic practitioners' perceptual and cognitive processes. Forensic handwriting identification is a discipline that uses these processes almost exclusively when determining the authorship of questioned writings. In spite of the routine use of handwriting evidence in courts of law internationally, the nature of the expertise and the theoretical claims made by the community of Document Examiners, until recent times, has remained almost devoid of programs that assist in the assessment of the validity of the process, including analysis of potential uncertainty rates. This has lead to significant criticisms of the field, particularly in the USA, which has been widely reported in the forensic literature.
The FEPL has evolved over the past 8 years through collaborations between the School of Human Biosciences (La Trobe University, Australia), the Special Advisory Group (Document Examination); which represents police and government Document Examiners in Australia and New Zealand, and the National Institute of Forensic Science. To date over 40000 blind trial opinions have been collectively expressed by the participants on handwriting and signature trials. In 2001 over 20000 opinions were expressed on blind trials by participants from 9 countries.

This presentation will provide a detailed insight into the expertise profiling program including the testing procedure, the revision and corrective action approach and the impact of the results on method and reporting procedures.

- **Approaches to Dynamic Ink Dating Methods**  
  Marc Gaudreau

Abstract: This presentation will discuss the general approach used at the Canada Customs and Revenue Agency (CCRA), to determine the approximate age of ink on documents. There are two generally accepted definitions with respect to methods that are used for ink dating: the **Static Approach** is based on classification/identification of various components in the ink compared to a reference collection and information. The **Dynamic Approach** is based on the measurement of chemical/physical processes in the ink that have ceased or that are still occurring at the time of analysis. The discussion will focus on both the advantages and disadvantages of the latter approach.

- **Handwriting Comparison – Three Different Languages (Part 2)**  
  Yana Gerber, Avi Abulafia

Abstract: The aim of this research project is to cross-examine the characteristics of handwriting written in different languages. Two hundred native Russian speakers who are also familiar with English and Hebrew were asked to write a given text in these three languages (Russian, English, and Hebrew). Preliminary results indicate a solid basis for comparison of both the general and topological pattern of the writing, as well as individual characteristics, including letter design.

- **The Osborn Legacy**  
  Dr. Audrey Giles

Abstract: In late 2001 the Giles Document Laboratory was tasked with determining if the Casement Diaries were genuine documents or forgeries. The Diaries date from 1903 to 1911 and, if the documents were forgeries, they would have been produced some time around 1916, the year of the trial and execution of Roger Casement.

This was an examination of early twentieth century material and presented the laboratory with some problems not normally encountered in our day-to-day study of contemporary documents.
However, great assistance was provided by Albert S Osborne – the problems of these early twentieth century documents, to a large extent, being solved by the application of principles and methods set out by this pioneer of our profession.

• **Write-On: Introduction**  
  Pierre Goudreault

Abstract: Write-On has been developed specifically for Document Examiners to dissect and report on handwritten documents. This presentation serves as a prelude to the evening workshop presented by Pikaso Software Inc. A general overview of the program, from its inception through its functions and uses will be discussed.

• **Write-On Evening Workshop**  
  Pierre Goudreault

Abstract: Write-On has been developed specifically for Document Examiners to dissect and report on handwritten documents. This workshop, offered by Pikaso Software Inc., includes a review of the many features of the program. Installation of the software, scanning and importing handwritten documents, typing transcripts, and performing word association are discussed in detail using a real case. The analytical features of the program such as word index, search options, search statistics, occurrence charts, search maps, and bin contents are presented. Participants are encouraged to bring their portable computer to follow and experience the examples discussed during the workshop.

A "Question and Answer" period and the presentation of three cases performed with Write-On will follow (a ransom case, a Spanish murder case, and a case involving multiple writers).

• **Establishing Forensic Handwriting Examination as a Science: Individuality, Reliability, Performance and Validity**  
  Richard C. Hanlen, Robert J. Muehlberger, Patricia A. Manzolillo and Grant Sperry

Abstract: This presentation describes how forensic handwriting examination can be established as a science rather than a technical skill. It will discuss how the various procedures currently used by forensic document examiners can be converted to a science through the correct application of the scientific method.

The specific steps necessary to establish forensic handwriting examination as a science include:
1) defining the objective of forensic handwriting examination, 2) defining the specific process of forensic handwriting examination, 3) segmentation of the forensic handwriting examination process into logical components, 4) creation of a set of standards, 5) creation of tests to check the reliability of each step of the process and 6) creation of tests to determine the affect of human interaction on each step of the process. The properties of individuality, reliability, performance testing and validity will be defined and discussed in the context of establishing forensic
handwriting examination as a science. In the same context, the actions and results and of the USPIS/PNNL project will be discussed. Future directions and suggestions for completing the work will be made.

- **My Perspective of the ASQDE and Its Members During the Early Years**
  Jack Harris

  **Abstract:** The ASQDE has been a part of my life and my family’s life for as long as I can remember. In 1937 I attended my first conference meeting at the tender age of 14 in Los Angeles. Albert S. Osborn and most of the others who founded the Society in 1942 were there. In 1949 I was elected to provisional membership and made a regular member in 1951.

  It is important to compare what went on during the early years with the ASQDE today. Should they be called The Golden Years and The Good Old Days? How did the members interact? What were the problems they faced and how were they handled?

- **Research 2002**
  Dr. Manfred Hecker

  **Abstract:** Critics of handwriting identification theory allege a lack of its academic infrastructure and therefore deny its claim to a scientifically based methodology. It must be stated on the one hand that this reproach displays a considerable lack of knowledge with respect to the research activities within all relevant reference sciences and, on the other hand, that research in this domain is also indispensable because of the general scientific obligation to broaden and deepen the essentially incomplete given level of any knowledge.

  Under the impression of September 11, 2001, the BKA has decided to emphatically force research and to further develop the FISH-system, which recently has been accepted into the Amicus Brief.

  Main items within this research concept will be the approximation of various pending questions within the discipline such as the quantitative off-line evaluation of handwriting dynamics, the development of a coefficient expressing the identifying value of short portions of handwriting (signatures) and the implementation of quality assurance measures including—among others—the harmonisation of expressing conclusions with respect to the Bayesian approach.

  This aim is to be realized by integrating those universities into the project team, who have been making considerable contributions to the research into fine motor control. Also the Fraunhofer Institute for Production Systems and Design Technology IPK, Department of Pattern Recognition in Berlin, Germany, as well as an institution for information technology will be partners in the project team.

  This paper intends to inform the relevant scientific community about our research activities in detail in order to avoid redundancy and encourage peer reviewing.
• Documentation and Implementation of Forensic Handwriting "Method" Incorporating Examiner Skill Assessments and Opinion Uncertainty Rates in the Casework Environment
Allan Herkt

Abstract: Since early 1998 all examiners in the New Zealand Police Document Examination Section (NZPDES) have adopted a fully documented method in order to formalise their approach to handwriting and signature examinations. Between March 1998 and June 2001, in tandem with the implementation of documented forensic methodology, six of these examiners completed a series of large forensic handwriting and signature blind trials. A total of 7494 opinions were expressed by the examiner group regarding the authorship of questioned handwriting and signature samples. The overall ‘called error’ rate (one calculated by excluding inconclusive data) was 0.4% of opinions. In addition a total of 2982 opinions were expressed on whether questioned signatures were, or were not, the product of a simulation (or imitation) process. There were no errors associated with these process opinions.

This paper considers the human, managerial and pragmatic aspects of implementing formal changes to the documentation of method and the exposure of the skill base to independent blind testing. The implications of this approach to the presentation of evidence to the judiciary will be discussed.

• Not Having a Defined Signature Can Cause Serious Problems
Carmen L. Hernandez Carmona

Abstract: The authenticity doubted in the various in the various signatures elaboration by the same author, which are constituted by a bigger or lesser quantity of graphic lines, is very common in the legal cases done in the Courts in the City of Tijuana, Baja California, Mexico.

• Spectral v. Chemical Ink Differentiation
Samiah Ibrahim

Abstract: The ability to differentiate inks of similar colour on a document is a challenge regularly faced by the forensic document examiner. A non-destructive means of ink differentiation is the use of conventional spectral imaging systems such as the Video Spectral Comparator (Foster and Freeman). It has previously been established (ASQDE 2000, Ottawa) that a spectral imaging system consisting of liquid crystal tunable filters and a forensic light source could be used to differentiate seven inks that could not be discriminated easily and effectively using conventional spectral imaging means. Chemical analysis of these seven inks corroborates the spectral findings. This paper will highlight the novel chemical technique used in the corroboration. Furthermore, this paper will discuss the impact of narrow versus broad bandwidth excitation/filtration on the discriminating power of spectral imaging systems and pressure variation of the seven inks.
• **Proficiency Testing 2002: Handwriting**  
  Dr. Moshe Kam

Abstract: In 1997 we published a study on the proficiency of professional document examiners in writer identification (Journal of Forensic Sciences 42(5)). This study was based on a test during which participants were asked to compare pairs of handwritten samples to each other and determine whether or not the samples were generated by the same hand (in the sense of "identification" and "strong probability" in ASTM E1658). This test was followed by a proficiency test on signatures (JFS 2001 46(4)).

The 2002 tests will expand on the 1997 and 2001 tests, by presenting to participants original handwritten items ("known" and "questioned") and requesting analysis of these items within a set of clearly defined parameters. The 2002 tests will be conducted in two 2-hour blocks on different days, in order to allow the use of the same original items by several examiners.

ASQDE conference attendees will be asked to volunteer to take the tests (participation on both days is requested) and to supply during the test a synopsis of their education, training, and type of practice. However the tests are anonymous. All test-taker information will be separated from the answer sheets once test scoring was complete, and no record of individual performance will be ever made or kept.

ASQDE conference attendees who wish to participate are kindly asked to bring along hand held magnifiers and other hand held equipment that they may require for examination of handwritten items (a microscope will be made available). It may also be useful to review ASTM E1658.

• **The Impact of U.S. v. Starzecpyzel: Then and Now**  
  Mary Kelly

Abstract: In March of 1995, handwriting identification faced its first Daubert challenge, in the case of *U.S. v. Starzecpyzel*. In this case, Judge McKenna concluded that *Daubert* did not apply to handwriting identification evidence and, instead, held it admissible as a "technical skill" per F.R.E. 702. The decision was especially critical of the perceived lack of empirical data available to support conclusions reached by document experts.

*Starzecpyzel* will be reexamined in light of more recent decisions, such as *Kuhmo Tire* and *Jones*, and in light of changes that have been made to the Federal Rules of Evidence. The work that has been done these past seven years, in an attempt to validate the methodology of Forensic Document Examiners and help ensure accurate findings, will also be considered.

• **Finger and Wrist Coordination During Handwriting Movements**  
  Kazuhiko Kobayashi

Abstract: The present study investigates wrist and finger coordination during handwriting movements. Movement of fingers and wrist was measured by means of the CyberGlove and the
tablet digitizer. The CyberGlove has 22 sensors for measuring the angle of each joint of finger and wrist. Also, the tablet digitizer was used for the measurement. Circle-drawing task was included in the experiment. The state of the change of the coordination could be realized.

• **Striation Patterns in New and Used Ball Point Pens**  
  Jane Lewis

Abstract: This study examines the incidence and individuality of ball point pen striations. The ink lines of new and used ball point pens are examined microscopically. Striations produced from high-end versus low-end pens are also considered. Differences in incidence of ball point pen striations are assessed from a sample of new pens versus a sample of used pens. Photomicrographs illustrate the types of ball point pen striations observed.

• **Seeing Ghosts and Reading Demons – ESDA Effects in Light of Current Discussions**  
  Gary Licht

Abstract: Unknown parameters abound in the collection, preservation and interpretation of indented writings. One very useful method for visualizing these indented writings is through the use of electrostatic imaging devices. In this paper, the instrument discussed is the Electrostatic Detection Apparatus (ESDA). A current theory of how writing impressions are suitable for visualization is reviewed in light of empirical data from experiments and field observations in casework. Recent discussions of the effects of environmental factors, for instance gloves, are fit into the framework of the theory.

Document examiners begin the examinations of potential handwriting impressions with many unknowns. The variables start with the manufacturing of the papers, and continue with the environment and actions occurring at the creation of the potential evidence, the collection of the evidence, the later handling of the papers, and the laboratory conditions surrounding the processing of the papers. Some information can be developed about why impressions may or may not be visualized with the ESDA whether they are visible with oblique lighting or not.

The purpose of this work is two-fold. First, to develop an efficient and safe way to collect and develop impression evidence with little to no loss of reasonable and resolvable detail. Second, to provide some theoretical explanations as to the “why” of the results.

• **Practical Problems in the Relative Dating of Inks**  
  Brian Lindblom

Abstract: The forensic document examination community has, over the years, expressed concern about the reliability of relative dating by the study of dye components as it has currently been practiced.
This paper explores some of the problems that have been encountered in forensic document examination when relative dating has been applied to casework. Consideration is given to the inconsistent application of testing techniques; to the inappropriate use of the methodology; to whether findings can be supported by the data; to the conclusions that have been contradicted by other factual information; and to the courts’ rejection of the technique. Several case examples are presented, each highlighting various difficulties with this relative dating approach. Also included is a brief review of literature which questions, or recommends abstaining from, the use of such a method in casework.

• **True Handwriting**
  Jeffrey H. Luber and Michael Mordente

Abstract: The transdermal absorption of a reactive infrared luminescent ink component will be discussed.

An unusual suicide case concerning handwriting on the palmar surface of the hand will be presented. The handwriting consisted of ballpoint ink, which had faded and was only partially decipherable to the unaided eye. An examination of the hand utilising infrared luminescence revealed the total text of the written words.

Inks possessing a transdermal infrared luminescent ink component were examined for their latency period.

• **Characterization of Photocopier Toner by X-Ray Photoelectron Spectroscopy (XPS): How They Change with Age**
  Albert H. Lyter III, Ph.D.

Abstract: Past work in the examination of photocopier toners has used various infrared spectroscopic techniques and pyrolysis gas chromatography. (1-5) These approaches have been successful in differentiating between various photocopier toner “libraries”, but with some overlap among toner formulations from the same manufacturer. X-ray Photoelectron Spectroscopy is an instrumental technique that measures the surface composition of a solid sample in regards to both elemental and chemical species. Through the use of high energy x-rays, characteristic photoelectrons are generated from the uppermost 20-100 angstroms of the sample. Data are correlated with known binding energy values to identify the particular atomic species. Due to chemical shifts caused by the immediate molecular environment of the examined atoms, chemical species information is also obtained. For example, the energy of a carbon atom in graphite has a different value from carbon contained in polymeric materials. The carbon and oxygen species, as well as the ratio of carbon to oxygen, are useful for the characterization of the various toner samples. Since most xerographic toners are polymeric in nature, the carbon atoms specifically associated with alcohol, carbonyl or ether bonds yield useful information.
Earlier work has shown that with age qualitative and quantitative changes occur. (6,7). This study involved the use of both heat and ultraviolet radiation to mimic the referenced changes on several different toner formulations. A variety of artificial aging conditions were evaluated and comparison with naturally aged samples categorized the parameters by which a toner samples “age” could be determined.

The characteristic surface sensitivity of XPS allowed for the direct examination of samples taken from documents without separation of paper from the toner component. The ability to remove paper, and therefore its components, from the analysis results in a clean sample absent of any contamination. This contamination can be inorganic, such as titanium or calcium from fillers or whiteners, or organic, such as carbon species from cellulose fibers or starch used as a coating. This technique provides a methodology by which the “age” of toner containing documents can be determined. Future work will include a more comprehensive study.

**Inks and UV - Visible Microspectrophotometric Analysis of Black Inks**  
Dr. Paul Martin

Abstract: Black inks are one of the most common found on Questioned Documents. Yet they are also one of the most difficult to analyze. The purpose of this paper is to show the results of a novel analysis of a series of commonly occurring black inks. The deep UV spectra (220 to 400 nm) of a samples as small as 4 microns were analyzed by measuring the transmission of the raw ink, the transmission of the ink on paper, and the reflectance of the ink on paper. The results are compared and discussed.

**ESDA Examinations: Factors Which Affect Their Success**  
Jan Masson

Abstract: Document Examiners have long been aware that ESDA results on the same document can vary from day to day or examination to examination. This paper will study factors that might affect the results obtained either positively or negatively. The purpose of the study is to provide information that assists the document examiner in improving the quality and consistency of his/her results and reduces the likelihood of inadvertently causing a poor result. Therefore, the focus of the study will be those aspects over which the document examiner has control. Subjects to be reviewed and/or studied include storage conditions, document handling apparatus (i.e., gloves, tongs), the condition of ESDA supplies, and individual examination techniques used.

**Write-On - A Useful Tool for Courier Typestyle Identification**  
Williams David Mazzella

Abstract: The Write-On™ software was investigated to visualize and classify various Courier typestyles included in the Haas catalogue. In addition to the typewriter typestyle a number of Courier Computer fonts were also added to the database.
The program is very useful to quickly visualize and search any features encountered in casework and in the Haas catalogue. During the presentation a practical casework will be highlighted.

- **ASTM Update**  
  Carl McClary  
  
  Abstract: The Scientific Working Group for Document Examiners (SWGDOC) has chosen the American Society for Testing and Materials (ASTM) as the publishing body for QD standards. An overview of the ASTM process will be given and instructions on how to participate in the process. The annual meeting of ASTM in Atlanta, Georgia in February produced great progress in the way of standard guides and terminology. An update on this progress will be given as well as what goals we have for future standardization.

- **Security Features in the New Euro**  
  Carl McClary  
  
  Abstract: On January 1, 2002 most of the European countries converted from their own individual currencies to the new euro. The change has not been without controversy, but is expected to be a unifying force in Europe as well as the rest of the affected world. As of February 28, 2002, old notes and coins were to be withdrawn from circulation. With the new notes and coins come security features similar to our own US currency and some additional ones. This paper will discuss the latest security features such as foil, printing, holograms and minting found in the new currency. Additionally, some background on the euro’s implementation and development will be given as well as the economic impact of this historic changeover since January 1.

- **A Corpus and Database for Determination of Relative Importance of Style Markers**  
  Gerald McMenamin  
  
  Abstract: The purpose of this paper is to present the results of a pilot study of a 100-letter subsample designed to develop ways to access the corpus and database, and to provide a model for adequate peer review and resultant refinement of the larger project. We will present the outcome of this work in the form of a workable CD-Rom that will model a suite of four tools that a forensic linguist would use to provide baseline data for determining the relative weight of particular markers of writing style: 1. Image corpus; 2. Plain-text corpus; 3. Tagged text corpus; and 4. Accessible database of selected style markers. The federal judiciary is applying stricter criteria for expert scientific opinions, one of which is that testimony must be based, at least in part, on the quantitative analyses of data. For linguistic stylistics, this means being able to assess the weight of a particular style marker by quantifying its relative probability of occurrence in a representative group of writers.

Requirements of a corpus are that it be large, randomly selected, non-request writing, and that subcorpora be isolated by region, community-size, typing/printing/writing, and sex of writer. The
requirements of a linguistic database are that all writings be available in digital-image form as well as in keyed-in text form as a plain-text corpus, that parts of the corpus be "tagged" for selected variables to form an interpreted corpus, and that tagged markers be available in statistical form in the database.

The goal of the AWP is to establish such a corpus of American and Canadian writing by collecting letters-to-the-editor from newspapers throughout the two countries. The U.S. corpus, which is about half completed, is designed to have letters-to-the-editor from 400 newspapers: 100 from each of four urban-to-rural areas, as defined by U.S. Census criteria, i.e., Metropolitan, Urbanized, Outside Urbanized, and Rural. Newspapers were randomly selected to represent proportionate populations in all census areas of the country.

- **A Review of the Eighth International Workshop on Frontiers in Handwriting Recognition (IWFHR-8)**
  Darlene Morin

Abstract: This presentation is intended as a review of the eighth International Workshop on Frontiers in Handwriting Recognition (IWFHR-8). The IWFHR series of conferences aims to provide a platform for researchers in the areas of on-line and off-line recognition of handwriting, in the area of pen-based interface development and systems for the processing of handwritten documents and forms in all languages. Topics covered in the course include opening and lingual processing, classifier design, on-line recognition, word recognition, learning methods, multiple classifiers, pen computing and document applications, signature verification and writer identification and off-line recognition. The review will contain a short overview of the program, posters, panel discussions and information presented during the conference. The presentation will conclude with an evaluation of the course and its usefulness to Forensic Document Examiners.

- **PTM - A New Way to Image Surfaces**
  Susan Morton

Abstract: Polynomial Texture Mapping, or PTM, was developed by Tom Malzbender and Dan Gelb of the Hewlett-Packard Laboratories as a way to create critically clear images of surfaces. Its initial purpose was to enhance computer graphics, but it was soon used by archeologists to render eroded clay cuneiform tablets legible. Its success in doing that has inspired inquiries from other fields such as dermatology and engineering. The purpose of this presentation is to describe the method to forensic document examiners in hopes that more applications may be discovered.

Like many innovations, PTM is basically a simple idea. Light striking a surface at an angle will reveal texture on that surface. Light coming from different angles and directions will disclose different parts of the texture. In PTM the light sources are precisely placed to cover a lighting hemisphere. The point sources impinge from near the horizon to near vertical and from all
points of the compass. Mathematically, one needs at least six lights, with more lights providing more detail. The current prototype has fifty light sources.

The PTM prototype currently in use consists of a hemisphere about a meter in diameter. This dome sits on a table and the subject object is placed underneath. An opening at the top gives access to a digital camera. The light sources are electronic camera flashes arranged around the hemisphere. A black cloth is placed around the base of the unit when it is in use to exclude extraneous light. A computer program activates each camera flash individually and a digital image is downloaded to the computer. With this procedure, 50 images of a static object are acquired under 50 separate lighting conditions. These images are then digitally processed into a PTM. PTM software then allows the user to vary the light source continuously to any location. Multiple light sources can be interactively established to highlight certain features. Light source positions not physically achievable can also be simulated yielding renderings that often reveal more information than can be seen with the human eye directly. Additionally, one can change not only light source direction, but also reflectance properties of the material itself. For instance, a clay object can be made to look metallic, and the extra specular reflections introduced are often helpful in the recovery of surface inscriptions or details.

All of the manipulations are electronic. PTM is completely nondestructive to the surface it is imaging. We have tested PTM on indented writing on paper. It does not work as well as the existing electrostatic instruments currently in use, but it will work on substrates where those instruments perform poorly. Thick notebooks and paper previously processed for fingerprints yield poor results with IMED and ESDA, but may respond well to PTM.

Is PTM of use to forensic document examiners? We would very much like your input, so please bear in mind these limitations:
1) The subject must be small enough to fit under the dome
2) Only one prototype currently exists. It can be taken out of the laboratory, but has limited portability. A portable model could be devised with enough demand.
3) The surface must be fairly flat, although some curvature is permissible.

PTM is a brilliant solution; help find a use for it.

- **Motion in Limine: Daubert Challenges to Expert Testimony in Forensic Document Examination (followed by Q & A Panel Discussion)**
  Robert Muehlberger (et al)

Abstract: Beginning with the 1995 case of *U.S. v. Starzecpyzel*, the admissibility of expert testimony by the Forensic Document Examiner (FDE) has been challenged in a number of Federal court districts. In some of these *Daubert* challenges, the deciding judges have either excluded, limited, or allowed the testimony of the FDE. These cases will be examined, primarily from the perspective of the FDE, in order to provide some meaningful information on the type of questions to expect from both the challenging parties and the court.
Additionally, the impact of testimony proffered by the “expert critic” advocating exclusion and by rebuttal witnesses in support of forensic document examination will be considered as to their effectiveness.

Q and A is expected to provide additional information and feedback, especially from those FDEs who have participated in the various Daubert hearings.

- **The Uniqueness of Facsimile Documents Due to Changes in Character Pixilation**  
  Sze-Wing Ngan, Graeme McCormack & Michelle Novotny

Abstract: Facsimile documents can represent key evidence in criminal investigations and civil litigation. Occasionally, document examiners are required to assist investigators and lawyers in determining the source of a photocopy(s) of a fax document. The primary objective of this research was to test the hypothesis that every page transmitted by a fax machine will be unique due to changes in character pixilation caused by the scanning process of the sending fax machine. The secondary objective was to test the hypothesis that every page transmitted by the broadcast function will bear similar changes in character pixilation caused by the single scanning process of the sending fax machine. The test documents were transmitted from one fax machine to individual fax machines located locally, interstate and internationally. This paper identifies whether changes in character pixilation can assist document examiners in identifying the source of a photocopy(s) of a facsimile document back to the original received facsimile from which that copy(s) was produced.

- **Determining the Sequence of Original Ink Writing and Toner Printing**  
  Michelle Novotny, Paul Westwood

Abstract: Document examiners are frequently called upon to determine the sequence in which intersecting entries were written. This paper arises from research undertaken to determine the sequence of intersecting original ink writings and toner printed text. One might intuitively expect that writing over toner would not penetrate the toner.

Tests were undertaken based on documents produced on a Hewlett Packard LaserJet printer and a combination of seventy different writing instruments. The subject intersections were prepared to test both sequences i.e. ink before toner and ink after toner. The points of intersection were examined microscopically before and after the removal of the toner. Corresponding intersections for the two sequences were compared. It was found that the extent to which the ink penetrated the toner varied between different ink types. Other aspects of this research are ongoing and will be the subject of a subsequent paper.
• Development of Line Sequencing Technology using MICS Optical Density Data
  Wayne Ogren, VP R&D and Patrick Love, President, Limbic Systems

Abstract: Research into line sequence determination methods using MICS optical density data is progressing along two primary development paths. Observation of various types of density shift patterns at ball pen line intersections is being conducted in a controlled and repetitive manner to accumulate statistical significance for each type of pattern. Reverse engineering of the line intersection ink deposit intends to empirically describe the process of ink deposition at the intersection region. An overview of each development path will be provided, along with preliminary findings, observations, and planned future work.

• Significant Applications of a Computer, Software Program and Printer Combination
  Maureen Owens

Abstract: In the modern sense, the question of authorship of a document often transcends the more traditional means of inscription, to delve instead into the complexity of computers, software, and printers. This is particularly true where handwriting and typewriting are nonexistent on a page. This paper looks at a computer-generated legal document for the purpose of ascertaining whether its production can be attributed to a person other than the representative as listed on the document. The paper, printing method, software program, and format of the product serve as investigatory leads to the possibility of distinguishing among similar form type documents, produced by similar programs, but by different individuals.

• The Interpol Forensic Science Questioned Document Reviews
  Peter Pfefferli

Abstract: The international INTERPOL forensic science symposium, held triennially at the General Secretary in Lyon (France), has become a high profile and unique forensic science forum for forensic managers from Interpol member states. The objective is to present triennially a progress review on the state of the art of the most relevant forensic evidence types. The reviews are established by so called coordinating laboratories: leading laboratories respectively centers of competence within one of the 15 reported disciplines. Up to now, the evidence type Questioned Documents has been split into two review areas: handwriting and non-handwriting. All relevant contributions from the international QD community within the reported period are supposed to be included in the symposium reports as well as the published symposium proceedings. It is up to the coordinating laboratory to call for contributions, by sending out questionnaires to the leading QD associations. QD laboratories and QD experts throughout the world. Since especially in forensic document examination only a few articles are regularly published in international scientific Journals, the retrieval of literary data does not forward the full information. Forensic QD Associations, (such as ASQDE), international Scientific Working Groups or Expert Working are therefore asked to help the coordinating laboratory in gathering for information to establish a comprehensive questioned document review. The 13th INTERPOL Forensic Science Symposium was held in 2001. The reported QD reviews will be included in the symposium proceedings coming out soon.
The Life and Times of Herbert J. Walter
Daniel C. Purdy

Abstract: Herbert J. Walter, one of Canada's pioneers in the field of forensic document examination emigrated from England in 1902. After a short stay in Saskatchewan, he moved to Manitoba and was hired by the Winnipeg Business College as a handwriting teacher and Assistant Principal.

He was taught the principles of handwriting identification by Eugene John O'Sullivan, reportedly the leading handwriting expert and best penman in Canada. Following his training, the two formed a partnership and testified at many noteworthy civil and criminal trials throughout Canada.

With some prompting from Albert S. Osborn, Mr. Walter moved to Chicago in August of 1930 where he operated a successful private practice until the 1950's. He examined documents and testified witness at many important trials of the century including the Lindbergh-Hauptmann case and the Al Capone tax evasion inquiry.

Herbert J. Walter, a founding member of the American Society of Questioned Document Examiners, suffered a fatal heart attack during the 1959 meeting of the International Association of Master Penman, Engrossers and Teachers of Handwriting.

Triplet & Sibling Handwriting Study to Determine Degree of Individuality & Natural Variation
Sandra Ramsey Lines and Frank E. Franck

Abstract: There have been no reports in the literature of handwriting studies that involved the comparisons of writings of triplets or comparisons of writings of multiple-birth siblings with their nonmultiple-birth siblings. The purpose of this small study, therefore, was to determine if the writing of one set of triplets and their nontriplet sibling could be distinguished and, if so, the degree of individuality in each subject's writing. Unlike previous twin/sibling studies, normal or natural variation (intrawriter variation) is examined and contrasted with differences or dissimilarities (interwriter variation). The findings support the concept of natural variation in handwriting and two of the premises of handwriting identification: (1) no two individuals write exactly alike, and (2) no one individual writes the same text exactly the same way twice.

An Evaluation of Sampling Methods for Microspectrometer Analysis of Document Evidence
Thomas P. Riley

Abstract: Microspectrometer analysis in document cases can provide valuable information. Microspectrometer examinations provide analysis of a specimen in Ultraviolet (UV reflected and transmitted), Visible (reflected and transmitted), and fluorescence (365nm [NU] and 405 nm [NV]).
In most instances, this type of examination can be conducted through non-destructive techniques, by merely placing the document to be examined upon the microscope stage. This research will be into the various means of examining document evidence utilizing a microspectrometer and to compare methods for preparing items for analysis.

- **Enhancing Interpretation Using Interactive 3D Surfaces**
  Wm. Paul Rogers, VP Product Development, Limbic Systems

  **Abstract:** Critical information contained in two-dimensional images is often locked within subtle nuances of grayscale value. The unaided human eye typically perceives approximately 30 shades of gray, effectively muting the information capacity available within grayscale images. The MICS software product maps image grayscale values to color intensity per pixel, creating a matrix of numbers that can be rendered as a 3D surface. This technique provides the practitioner a means of viewing all the information locked within an image as changes in height on a 3D surface rather than attempting to interpret shifts in grayscale directly through the muted information available to the unaided eye. The 3D surface rendered in MICS can be interactively rotated, scaled, translated, and enhanced using various pseudo-color schemes.

  This session overviews the concepts and techniques used to render a 2D image as a 3D surface. Demonstrated examples show how an interactive 3D view of image information assists Forensic Document Examiners in their study and analysis.

- **Handwriting Identification: Back to Reality**
  Tom Vastrick

  **Abstract:** In December, 2001, the University of Virginia Law Review published two papers dealing with forensic document examination. Much of what was published contained inaccurate information and incorrect innuendo. Our field has come to learn that we must make issue of the spreading of this type of misinformation and have taken steps, primarily by shoring up the basis of our profession and our methodologies.

  One such action has been the establishment of “The Daubert Group,” an informal information exchange involving examiners with the desire to help. This group, headed by Jan Kelly, has been of immeasurable assistance to examiners facing Daubert challenges. One idea that has been circulated among this group is to submit a response to the University of Virginia articles. A draft of this response is being presented at this ASQDE meeting.

  As a field, it is vital that we enter into such publishing with unanimity. The content of such a response must not only be accurate, but acceptable to the field as a whole. It is the purpose of this presentation to foster discussion as to whether a response is warranted, whether this method of response is the correct method, and to provide a draft form from which all examiners can contribute ideas, changes, additions, or omissions was we see fit.
- **Trends and Technologies in Check Truncation: Paper Checks – A Thing of the Past**
  Katherine Voelker Schoenberger

Abstract: This presentation will provide information about new check-receiving technologies as well as the proposed Check Truncation Act. Shortening the check collection process may have an impact on forensic document evidence. The Check Truncation Act proposed for law by the Federal Reserve Board, will allow financial institutions to conduct electronic transactions and bypass the exchange of original paper checks. Instead of the original check, the check’s image or electronic information would be sent to the payer’s financial institution. Also, there are technologies that eliminate the original check at the point of sale. Thus, if this proposed Act is implemented or these other technologies become more mainstream, there may be an increase in the number of questioned document cases where there is no “original” check. Receiving an original check as evidence may become a thing of the past.

- **American Board of Forensic Document Examiners**
  Jan Seaman Kelly

Abstract: ABFDE Certification testing and FSAB requirements will be discussed. The recipient of the New Horizon Award and the recipient of the Charles C. Scott Award will be announced. Presentation of the Award(s) will be made if the recipient(s) are present.

- **Unique Impressions**
  Jan Seaman Kelly

Abstract: This presentation will discuss stamp impressions that a document examiner might encounter in case work. The characteristics observed in impressions created by the flat die self inking stamp and the high resolution laser foam die stamp will be discussed.

The flat die self-inking stamp entered the market May 1st and is manufactured by Millennium Marking Co. The high resolution laser foam stamp creates half tone impressions and is a security feature in the prevention of counterfeiting stamps. Both types of stamps will be available for those who would like to make sample impressions to add to their reference library.

- **Unusual Document Examination Approaches and Their Relationship to Daubert Challenges**
  Larry F. Stewart

Abstract: Daubert challenges are routine in the areas of DNA, Questioned Document and Latent Print Examinations. Sometimes, examiners are required to utilize unusual approaches or techniques that have not been the subject of prior Daubert challenges. What should an examiner do in these circumstances? Not examine the evidence, not reach a finding or hope that the findings will not be challenged? Are the forensic scientists allowed to explore the cutting edge of the field or does that action jeopardize a person’s right to freedom, due to the usage of
unproven techniques? During this discussion, case examinations will be explored that have utilized unusual forensic approaches and we will examine whether or not they can meet the strict guidelines of a Daubert Challenge.

- **The Case of the Faked Faxes – the Fashion House vs. the Private Investigator**
  Steven J. Strach and Paul D. Westwood

  **Abstract:** In a recent highly publicised case in Australia, this laboratory was engaged by the plaintiff to examine a number of purported facsimile transmission copy documents relied upon by the defendant in a Civil case. The lawyers for the plaintiff were suspicious about the genuineness of the faxes which purported to confirm a business relationship between the defendant and the late Gianni Versace.

  Following examination of the facsimile documents by Dr. Strach and Mr. Westwood, Dr. Strach presented evidence which was crucial to the case put to the Court by the plaintiff company.

  In this paper, the combined evidence, which pointed to the purported fax received documents having their origins in composites of documents, will be presented. Examination of four of the documents revealed very strong evidence of the documents being based on manipulated reproductions of a single, apparently genuine, fax received document transmitted from the plaintiff company.

  Various strands of evidence led to the very strongly worded conclusion. Some of these pieces of evidence were clear and straightforward, although not necessarily to the layperson or someone new to the field of forensic document examination. Other clues from the examination were more subtle and not of obvious significance at first sight, but nevertheless added significant weight to the combination of evidence against the documents being genuine.

  It is hoped that, by presenting in some detail the nature of all the information gleaned from a mostly macroscopic examination of the fax documents, other examiners may be alerted to what to look for in cases involving questioned fax received documents.

- **The Fundamental Things Apply: Some Concise Technical Comments Germame to the Forensic Document Examinations in the Case Concerning Maritime Delimitation and Territorial Questions between Qatar and Bahrain at the International Court of Justice**
  Peter Tytell

  **Abstract:** On 16 March 2001 in The Hague President Guillaume of the International Court of Justice, the principal judicial organ of the United Nations, delivered the Court’s Judgment in the case concerning Maritime Delimitation and Territorial Questions between Qatar and Bahrain, the longest running case in the Court’s history (and perhaps the longest judgement). The case centered on a territorial dispute between the State of Bahrain and the State of Qatar, involving Qatar’s claim filed in July 1991 to “sovereignty over the Hawar islands, sovereign rights over the shoals of Dibal and Qit‘at Jaradah, and the delimitation of the maritime areas of the two States”.

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an area that in total represented sizable portion of the territory of Bahrain. While the judgement (which preserved Bahrain’s sovereignty over the Hawar Islands) is considered by some to be among the most important ever handed down in the area of boundary rights by that tribunal, it did not take into consideration a collection of almost seven dozen documents from the Qatari Diwan Amiri Archives that were submitted in support of Qatar's position.

These documents, which would have virtually ‘made the case’ for Qatar, were examined by a team of experts for Bahrain including scholars specializing in Gulf and Ottoman history and in the development of international boundaries in the area, as well and American and Egyptian forensic document examiners. The experts for Bahrain concluded that the entire collection was not genuine.

It is not surprising that a similar team of experts for Qatar reviewed and criticized the reports of the various experts for Bahrain; however, what may be surprising is that the forensic document examiners for Qatar concluded that virtually all the questioned documents “contain faults or flaws which cannot be refuted or rebutted.” Largely as a result of the examinations of the forensic document examiners (on both sides), Qatar “decided [to] disregard all the 82 challenged documents for the purposes of the present case....” Subsequently Qatar expressed “its regret at the situation that has arisen and the inconvenience that this has caused to the Court and Bahrain.”

The presentation will focus on the basic methodologies used in the technical examinations of the questioned documents. These included examinations of the paper, paper fracture (tear) matches, rubber stamp impressions, seal impressions in wax and inked impressions on paper. Both questioned to known and questioned to questioned comparisons were involved in the examinations.

• A New Check Security Feature: Thermochromic Inks Paper
  Charlotte Ware

Abstract: One of the new check security features being utilized is the use of thermochromic ink printing. These types of ink change color when subjected to changes in temperature. The uses of these inks both in check security and other applications will be covered. The chemistry and technology used to produce the inks will be discussed, as well as the printing processes that can be used with thermochromic ink.

• In-situ Analysis of Writing Inks by Surface Enhanced Resonance Raman (SERRS) Spectroscopy
  Dr. Peter White

Abstract: Many of the techniques that can be used for the analyses of inks on documents require extraction prior to their analysis. However, this can lead to problems since the ink may contain pigments which cannot be extracted, dye mixtures which may not be extracted quantitatively or decompose during extraction. The ideal approach is to use an in-situ
method of analysis that does not require any separation of components and is non-destructive. With the vision that this may be possible to achieve these using SERRS spectroscopy, the University Raman Group has spent nearly nine years developing this technique into a robust and reliable technique. The results obtained for trace forensic samples, including writing inks have been extremely encouraging.

SERRS spectroscopy originated from the combination of two techniques namely, surface enhanced Raman scattering spectroscopy (SERS) and resonance Raman (RR) spectroscopy. This combination can lead to a tenfold increase in sensitivity, sharp Raman bands in spectra and considerable reductions in fluorescence background signals. The latter is a major problem in traditional Raman spectroscopy since fluorescence can obliterate the weak scattered light signals from a sample. The surface enhancement effect is achieved by using an aggregated silver colloid but for optimum results and reliability, reproducible batches of colloid are required together with a suitable aggregating agent. A brief description of the SERRS technique will be presented.

The method devised for the in-situ analyses of neutral, acidic and basic colourants requires the use of poly(L-lysine) as the aggregating agent and this is applied to the coloured item and allowed to dry prior to the application of a concentrated sample of the colloid. Results from extensive studies performed on a variety of ink dyes will be presented to illustrate the advantages of using SERRS for the analysis of writing inks. Spectra obtained from analyses taken with the laser focused on a single area of a script and also at different points along the same script will be shown to highlight the reproducibility of the technique, the homogeneity of the inks dyes and that no photodecomposition has occurred.

In addition to showing the discriminative power of the technique by being able to distinguish between different ball pen inks, an example of the detection of an alteration in a document will be presented. This example will also show that unless the script is viewed under a microscope the reagents ie., the poly(L-lysine) and colloid which are applied to the script, cannot be detected thus making this a technique that is virtually non-destructive. Finally, results for the re-analysis of this document will show that this can be performed after three years and still yield the original results.

• Is It Really Possible to Determine The Age of An Ink? Paper Not Submitted For CD

Abstract: Something document examiners have been seeking to do for many years is trying to determine the age of an ink. However is this really possible? This presentation reviews methods that have been published and highlights and explains why there are some concerns in using these methods. There are, a few exceptions when the age of a document can be estimated. The earliest dates of materials that make up a document or changes in the materials used can certainly help the examiner. Dating by comparison with known undisputed material is possible, provided that document is prepared on the same paper, with the same ink and stored under similar conditions. Finally, the relatively reliable method of ink dating by detection of taggants added to inks on known dates could be used. However, the addition of tags to inks was started in 1975 and continued for only a few years, thus limiting the usefulness of this excellent ink dating method.
In many cases these methods are inappropriate as suitable data and reference samples are not always available. Therefore, numerous methods have been developed and published specifically for ball pen inks, which try and overcome these problems. Nearly all of these have been based upon the fact that after an ink is applied to a document, an ageing process will start and the ink composition will change with time. With ball-point pen inks, methods have been proposed for measuring the decay/time relationships of the volatile and/or the dye components. However, many scientists through the world have been unable to obtain reproducible results in their laboratories. There is also the difficulty of the decay curves being monotonic, with the rate of decay changing by only very small amounts over a time period as the age of the document increases. This exponential behaviour of ink components with time can therefore give rise to major inaccuracies in estimating the age of an ink.

The majority of the published methods appear to have overlooked or failed to take fully into account some of the fundamental physical and chemical properties of the ink or paper components. For example, some inks contain dyes and/or pigments which are chemically and photochemically stable and will not change with time and yet there has been no study to identify which classes of dyes do decompose. With dyes that are known to decompose, no in-depth studies have been reported on what chemical properties of a paper (chemical composition, pH, water content, etc) or the volatile components in the ink, may have on the decomposition of dyes.

Results from experiments performed in the authors' laboratory will be presented to illustrate some of these important factors. Triarylmethane dyes, a class of dye common to many of the inks used in ball-point pens, eg., Methyl and Crystal Violet, Victoria Blue B and Blue BO and malachite green will be used to illustrate the problems. To overcome any problems associated with extraction of these dyes and inks from paper, a semi-microspectrophotometric in-situ method of analysis was used to examine their photochemical degradation and oxidative decomposition.

From the microspectrophotometric data obtained, chromaticity co-ordinates were generated and used to study the decay profiles of the dye standards and inks applied to paper and solutions of the dye standards. The decomposition studies were performed by subjecting these samples to UV radiation or chemical oxidation or reduction. TLC and UV spectroscopy of extracted ink dyes and the dye solutions were also obtained. Even under these rigorously controlled conditions the results of these preliminary studies that are presented must still raise the question in a document examiner's mind – is it really possible to determine the age of an ink?
A FLUENT TRACING - A CONTRADICTION IN TERMS?

Abstract: This is a casework example of a highly skilled partial tracing of a signature facilitated by the structure of the signature and an awareness by the copier that a perfect replica is not necessarily required.

Robert Radley
POSTER PRESENTATIONS

• Arabic Handwriting and Signatures  
  Major Mohammed Aloyoni

Abstract: The fear of facing the unknown has been shared by most of mankind and is done with caution. When the Forensic Document Examiner has a case written in a foreign handwriting system, he/she needs to approach it with extreme caution when developing an opinion. Thorough research and study of the characteristics of unfamiliar handwriting should be conducted. However, few examiners have the luxury of time to do all that work. With the many cases written in foreign handwriting, this paper will hopefully provide valuable information and insight when it comes to examining Arabic handwriting styles and signatures.

• Off-line Handwritten Signature Verification with Expert-Experience-Assistance  
  Kun-Chi Cheng, Chin-Chun Kuo, Nai-Jen Cheng, Hwang Liu, Hu-Sheng Chen, Hsien-Hui Meng, Shu-Jen Sheu, Bor-Shenn Jeng

Abstract: Signature verification is very important in many fields such as money transaction, questioned document, and high security accesses. Many signature verification systems have been developed and proposed. Two different classes of system are designed for signature verification, the class of off-line and of on-line signature. The off-line signature verification system deals with data acquisition with optical method by optical scanner and CCD camera. On the other hand, the on-line signature verification system acquires the signature data with electrical device, such as a digitizer, generating electrical position signal in time sequence during writing processes.

This paper will focus on the field of off-line handwritten signature verification. The verification system is operated in two mode training (learning) mode and classification (testing) mode. The processes of off-line signature verification are data acquisition, processing segment extraction, feature extraction, feature learning to build template and feature matching with template. After the state of feature matching, we will get the possible verification results.

In the state-of-the-art research of signature verification, there are few systems for signature verification considering the experiences from verification experts. It is difficult to reach the state of fully automatic signature verification by matching and to get correct verification results without experts. In our research program, an off-line handwritten signature system with human-expert-assistance will be built.

Several features will be included in the off-line handwritten signature verification system. The features are global features (length-to-width), Fourier frequency features, distortion features, heavy pressure features with expert’s assistance, and long stroke features. Gray level contour is used to deal with the pressure property of hidden information in the signature. Fourier transform is used to extract and to analyze the spatial frequency of handwritten signatures. The above
features need to be classified through expert’s experience and to be weighted by different matching techniques.

- **Ingenuity of the Incarcerated Criminal**
  
  Joan DiMartino

  Abstract: This case involving the falsifying of court documents and forgery was submitted to the Maryland State Police Crime Laboratory with a request for examination of the documents. An inmate at the Maryland Penitentiary had served 10 years and 217 days of three consecutive life sentences for a triple homicide. With a creative plan of action, he was able to access official documents through a contact in the court system. A judge’s signature appeared on an Order of Court which was an imitation and sentencing modification records merging counts were forged, all of which contained what appeared to be official court seals. The object of these false documents was to give this inmate credit for time served – 10 years and 217 days. If not for the keen eye of a clerk in the Pre-Release center, this inmate would have been a free man again in a matter of days. The poster presentation will include digital photographs of the evidence submitted for examination.

- **As Common As We Think? An Evaluation of Some “Common” Characteristics of 1000 Writers**
  
  Traci L. Moran

  Abstract: Accurately placing more or less significance on various features of an individual’s writing is the basis of handwriting identification. The purpose of this research was to evaluate the frequency of occurrence of some common characteristics in the writing of 1000 individuals. Bodies of hand printed text of 1000 writers were used to evaluate such aspects of the writing as: the use of uppercase forms of letters where lowercase would be expected, as well as, the use of connecting strokes between hand printed letters to create “speed” printing. There were other common characteristics that could have been considered, however, the author selected these two seemingly common categories to evaluate. Future research will follow.

- **Whose Passport Is It Anyway?**
  
  Darlene Morin

  Abstract: The substitution of passport photographs and signatures without damaging the underlying biographical page is an ongoing challenge faced every day by Intelligence Officers and Forensic Document Examiners at the U. S. Immigration and Naturalization Service Forensic Document Laboratory.

  While other Forensic Document Examiners have reported on the use of un-du® adhesive remover as an effective method of removing tape and self-adhesive stamps, this poster presentation focuses on the use of un-du® and other commercially available ink and adhesive...